Chapter C1: Regional Approach

INTRODUCTION

For the Section 316(b) Phase II benefits analysis EPA examined impingement and entrainment (I&E) losses, and the economic benefits of reducing these losses, at the regional level. The estimated benefits were then aggregated across all regions to yield a national benefit estimate.

The primary objective of the regional approach was to refine the scale of resolution of the benefits case studies conducted for proposal, so that extrapolations were within regions rather than nation-wide. Extrapolation of I&E rates was necessary because not all in scope facilities have I&E data. It also was not possible to evaluate all of the data from the many facilities nation-wide that have conducted I&E studies. At the same time, in many cases available data were not suitable for further analysis.

While EPA believes that extrapolation within regions was reasonable for the national rulemaking, the Agency is not advocating that this approach be followed for impact and/or benefits analyses that might be conducted for individual National Pollution Discharge Elimination System (NPDES) permits. At the individual permit level it is possible to conduct a more detailed, site-specific analysis on the environmental ramifications of cooling water intake structures than was necessary or feasible for the national-level analysis.

C1-1 DEFINITIONS OF REGIONS

EPA defined seven regions for its analysis based on similarities in the affected aquatic species and characteristics of commercial and recreational fishing activities in the area. These regions and the waterbody types within each region are described below. Maps showing the facilities in each region that are in scope of the Phase II rule are provided at the end of this chapter.

C1-1.1 Coastal Regions

Coastal regions are fisheries regions defined by the National Atmospheric and Oceanic Administration (NOAA) National Marine Fisheries Service (NMFS). Table C1-1 presents these geographic areas and the number of facilities included in each NMFS region. The California region includes all estuary/tidal river and ocean facilities in California. The North Atlantic region includes all estuary/tidal river and ocean facilities in Maine, New Hampshire, Massachusetts, Connecticut, and Rhode Island. The Mid Atlantic region includes all estuary/tidal river and ocean facilities in New York, New Jersey, Pennsylvania, Maryland, the District of Columbia, Delaware, and Virginia. The South Atlantic region includes all estuary/tidal river and ocean facilities in North Carolina, South Carolina, Georgia, and the east coast of Florida. The Gulf of Mexico region includes all estuary/tidal river and ocean facilities in Texas, Louisiana, Mississippi, and Alabama and the west coast of Florida. There are no facilities in scope of Phase II regulation in Oregon or Washington State.

Table C1-1: Definition of Costal Regions				
Region	Geographic Area	Number of Estuarine Facilities	Number of Ocean Facilities	Total Number of Facilities
California	California	8	12	20
North Atlantic	Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut	20	2	22
Mid Atlantic	New York, New Jersey, Delaware, Maryland and Virginia	44	0	44
South Atlantic	North Carolina, South Carolina, Georgia, East Florida	15	1	16
Gulf of Mexico	West Florida, Alabama, Missouri, Louisiana, Texas	21	3	24
Total Number of Estuarine and Ocean Facilities[a]		108	18	126

[a] In addition, there are 3 ocean facilities in Hawaii that are not included in the NMFS-defined regions.

Source: U.S. EPA analysis, 2004.

C1-1.2 Great Lakes Region

The Great Lakes region includes all 56 facilities located on the shoreline of a Great Lake or on a waterway with open passage to a Great Lake and within 30 miles of a lake in Minnesota, Wisconsin, Illinois, Michigan, Indiana, Ohio, Pennsylvania, and New York. This definition is based on EPA's estimate of the extent of the spawning habitat of Great Lakes fish species, including spawning habitat in rivers and tributaries of the Great Lakes. The distance each species may travel upstream to spawn varies depending on both the species and the waterway, and is influenced by obstacles such as dams. However, after consultation with local fisheries experts, EPA determined that inclusion of waters within 30 miles of the Great Lakes is likely to encompass spawning areas of Great Lakes fishes. EPA used geographic information systems (GIS) to determine which facilities are on a waterbody that has unobstructed passage to the Great Lakes and is within 30 miles of a Great Lake. Data from the Lake Huron Project were used for areas encompassed by that project. For areas not covered by the Lake Huron Project, this was done using the Enhanced Reach File 1 (ERF1) streams coverage (Alexander et al., 1999), the national dams coverage (U.S. Army Corps of Engineers, 1999), and a basic US states coverage. No facilities drawing from other lakes or reservoirs were included among the Great Lake facilities unless the waterbodies were connected to the Great Lakes.

C1-1.3 Inland Region

The Inland region includes all 358 facilities located on freshwater rivers or streams and lakes or reservoirs, in all States, with the exception of facilities located in the Great Lakes region (defined above in Section C1-1.2). Of the 358 inland facilities, 244 are located on freshwater rivers or streams and 114 are located on lakes or reservoirs.

C1-2 DEVELOPMENT OF REGIONAL I&E ESTIMATES

For the case studies presented at proposal, EPA conducted species-specific analyses of I&E on a facility-specific basis. For the regional studies, EPA evaluated species groups comprised of species with similar life histories. Groups were based on biological family groups or the groupings used by NMFS for landings data. For example, various anchovy species were grouped together as "anchovies." For the regional studies, EPA evaluated I&E rates for such species groups and developed a regional total I&E estimate by summing results for each group. An exception was made for species of exceptionally high commercial or recreational value (e.g., striped bass). Such species were evaluated as single species.

Aggregation of species into groups of similar species facilitated parameterization of the fisheries models used by EPA to evaluate facility I&E monitoring data. Life history data are very limited for many of the species that are impinged and entrained. As a result, there are many data gaps for individual species. To overcome this limitation, EPA used the available life history data for closely related species to construct a single representative life history for a given species group. For previously completed case studies, EPA used the species-specific life history information that was previously developed and then aggregated I&E results for the species within a given group to obtain a group estimate. Appendices to the regional

studies (Parts B-H of the Regional Study Document; U.S. EPA, 2004) provide tables of all life history data and data sources used by EPA for the regional analyses.

EPA believes that the species group approach is appropriate for the national rulemaking given the many data limitations associated with the lack of knowledge of specific fish life histories, particularly the growth and mortality rates of early life stages. However, EPA is not endorsing this approach for analyses to support individual permits related to specific waterbodies and facilities. At the individual permit level, more detailed information regarding the life histories of individual species is often available and, when available, it should be used.

EPA converted annual I&E losses for each species group into (1) age 1 equivalents, (2) fishery yield, and (3) biomass production foregone using standard fishery modeling techniques (Ricker, 1975; Hilborn and Walters, 1992; Quinn and Deriso, 1999). Details of these methods are provided in Chapter A5 of the Regional Study Document. Chapter A6 discusses data uncertainties. For all analyses, EPA assumed 100 percent entrainment mortality based on the analysis of entrainment survival studies presented in Chapter A7 of Part A of the Regional Study Document.

To obtain regional I&E estimates, EPA extrapolated losses from facilities with I&E data to facilities without data. These results were then summed to obtain a regional total. Average annual results for facilities with I&E data were averaged and extrapolated on the basis of operational flow, in millions of gallons per day (MGD), to facilities without data. The extrapolation method used, by region, is:

Total losses at case study facilities * Total flow in the region / Flow at case study facilities

These regional estimates are for 540 in-scope facilities that completed the 316(b) facility survey (excluding the three Hawaii facilities). To obtain complete national I&E estimates EPA performed two additional steps. First, a set of statistical survey weights was developed to estimate losses for 11 facilities that did not provide a completed 316(b) survey. Applying these weights provides and estimate for all 551 in-scope facilities in the continental U.S. Second, EPA estimated losses at the three in-scope facilities in Hawaii based on losses per unit flow in the other coastal regions. The weighting and the estimates of losses in Hawaii provide loss estimates for all 554 in-scope facilities.

The regional analyses incorporated data for many more facilities than were evaluated for proposal, and thus improved the basis for EPA's national benefits estimates.

C1-3 DEVELOPMENT OF REGIONAL AND NATIONAL BENEFITS ESTIMATES

EPA considered the following benefit categories in its regional and national benefits analyses: recreational fishing benefits, commercial fishing benefits, and non-use benefits. Non-use benefits include benefits from reduced I&E of forage species, threatened and endangered species, and the non-landed portion of commercial and recreational species. The analysis of direct use benefits for each region includes benefits to recreational anglers from improved fishing opportunities due to reduced impingement and entrainment based on a region-specific valuation function and benefits from improved commercial fishery yield. Details of the methods used to estimate commercial fishery benefits and recreational fishery benefits are provided in Chapters A10 and A11of the section 316(b) Phase II Regional Study Document (U.S. EPA, 2004), respectively. EPA also explored methods for evaluating non-use benefits, although the Agency was not able to monetize nonuse values (for further detail see Chapter A12 of the Regional Study Document).

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